National Institute of Environmental Health Sciences

Climate change cannot explain the upsurge of tick-borne encephalitis in the Baltics

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Abstract:

BACKGROUND: Pathogens transmitted by ticks cause human disease on a greater scale than any other vector-borne infections in Europe, and have increased dramatically over the past 2-3 decades. Reliable records of tick-borne encephalitis (TBE) since 1970 show an especially sharp upsurge in cases in Eastern Europe coincident with the end of Soviet rule, including the three Baltic countries, Estonia, Latvia and Lithuania, where national incidence increased from 1992 to 1993 by 64, 175 and 1,065%, respectively. At the county level within each country, however, the timing and degree of increase showed marked heterogeneity. Climate has also changed over this period, prompting an almost universal assumption of causality. For the first time, we analyse climate and TBE epidemiology at sufficiently fine spatial and temporal resolution to question this assumption. METHODOLOGY/PRINCIPAL FINDING: Detailed analysis of instrumental records of climate has revealed a significant step increase in spring-time daily maximum temperatures in 1989. The seasonal timing and precise level of this warming were indeed such as could promote the transmission of TBE virus between larval and nymphal ticks co-feeding on rodents. These changes in climate, however, are virtually uniform across the Baltic region and cannot therefore explain the marked spatio-temporal heterogeneity in TBE epidemiology. CONCLUSIONS/SIGNIFICANCE: Instead, it is proposed that climate is just one of many different types of factors, many arising from the socio-economic transition associated with the end of Soviet rule, that have acted synergistically to increase both the abundance of infected ticks and the exposure of humans to these ticks. Understanding the precise differential contribution of each factor as a cause of the observed epidemiological heterogeneity will help direct control strategies.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1876807

Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Estonia;Latvia; Lithuania

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Tick-borne Encephalitis

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content